



ICAO ENGINE nvPM EMISSIONS DATA SHEET

SUBSONIC ENGINES

ENGINE IDENTIFICATION: SaM146-1S18 BYPASS RATIO (-): 4.4
UNIQUE ID NUMBER: 01P11PJ004 PRESSURE RATIO π_{co} (-): 22.8
COMBUSTOR:
ENGINE TYPE: MTF RATED OUTPUT F_{co} (kN): 72.7

REGULATORY DATA

CHARACTERISTIC VALUES:	LTO_{mass}/F_{co} (mg/kN)	LTO_{num}/F_{co} (particles/kN)	NVPM MASS CONCENTRATION ($\mu\text{g}/\text{m}^3$)
LTO/ F_{co} AND MAX nvPM _{mass}	336.0	2.89E+15	1099
AS % OF CAEP/10 LIMIT	-	-	14.0
AS % OF CAEP/11 LIMIT (InP)	10.9	15.6	
AS % OF CAEP/11 LIMIT (NT)	44.9	32.0	

MEASURED DATA

MODE	POWER SETTING (% F_{co})	TIME minutes	FUEL FLOW kg/s	EMISSIONS INDICES*		NVPM MASS CONCENTRATION PEAK nvPM _{mass} ($\mu\text{g}/\text{m}^3$)
				EI _{mass} (mg/kg)	EI _{num} (particles/kg)	
TAKE-OFF	100	0.7	0.841	166.0	1.03E+15	
CLIMB OUT	85	2.2	0.691	124.0	1.09E+15	
APPROACH	30	4.0	0.238	2.7	1.30E+14	
IDLE	7	26.0	0.100	1.7	5.23E+13	
LTO TOTAL (kg, mg, number of particles)			339	17574	1.51E+17	-
NUMBER OF ENGINES				1	1	1
NUMBER OF TESTS				3	3	3
AVERAGE LTO/ F_{co} VALUES (mg/kN, particles/kN)				242.0	2.08E+15	-
MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ($\mu\text{g}/\text{m}^3$)				166.0	1.11E+15	854

* Emissions Indices are corrected for thermophoretic loss and fuel hydrogen content

DATA FOR EMISSIONS INVENTORIES (ESTIMATIONS FOR ENGINE EXIT PLANE VALUES)

MODE	POWER SETTING (% F_{co})	CORRECTED EMISSIONS INDICES	
		EI _{mass_SL} (mg/kg)	EI _{num_SL} (particles/kg)
TAKE-OFF	100	193.0	2.58E+15
CLIMB OUT	85	149.0	3.05E+15
APPROACH	30	4.3	7.85E+14
IDLE	7	2.4	2.56E+14

AMBIENT CONDITIONS

	From	To	FUEL	
BAROMETER (kPa)	99.3	100.4	HEAT OF COMBUSTION (MJ/kg)	43.10
TEMPERATURE (K)	286.4	299.2	HYDROGEN CONTENT (%mass)	13.77
HUMIDITY (kg water/kg dry air)	0.0062	0.0125	AROMATICS CONTENT (%vol)	17.9
			NAPHTHALENE CONTENT (%vol)	1.37
			SULPHUR CONTENT (ppm by mass)	694

MANUFACTURER: PowerJet S.A.
TEST ORGANIZATION: PowerJet S.A.
TEST LOCATION: Villaroche, France
TEST DATES: 04/06/2019-07/06/2019

REMARKS

- Test engine 146009-1B
- Certification report CR-037 S2 / CR-137 / CR-237 Rev1